

Remarks/Arguments

The present invention provides a silicone surfactant (polyether-polysiloxane copolymer) for stabilizing the cell formation in the preparation of rigid polyurethane and/or polyisocyanurate foam blown with C4 and/or C5 hydrocarbon blowing agents, the silicone surfactant comprising a polyether-polysiloxane copolymer represented by the formula shown in the pending claims.

Claim 1 has been amended to recite that the polyether-polysiloxane copolymer is used at 0.5 to 3.5 parts by weight per 100 parts polyol as in Claim 11 and as disclosed in paragraph [0029]. Claims 1, 2, 4, and 17 have been amended to recite the lower limit of the parameter $x+y+2$ is 67 as shown in the Examples. (See the table of paragraph [0047].)

Use of the defined silicone surfactants in the production of rigid polyurethane foams using a C4 and/or C5 hydrocarbon blowing agent provides one or more of the following advantages as manifested in the Examples:

- Foams with improved performance properties in appliance applications,
- Improvement in thermal insulation,
- Improvement in minimum fill properties that relate to a reduction in density,
- Reduction in voiding which relates to how well the foam fills the mold without excessively large air pockets just below the surface of the foam,
- Enhanced surfactant compatibility in the polyol resulting in a decreased tendency for the hydrocarbon blowing agent to separate after aging.

Claims 1-22 were rejected under 102b as being anticipated by Chojnacki (US 5,883,142). Applicants submitted that Chojnacki neither anticipates nor renders obvious the subject matter as a whole defined by the pending claims. Chojnacki is deficient with respect to teaching the preparation of rigid polyurethane foams using a C4 and/or C5 hydrocarbon blowing agent. Chojnacki's invention is directed to making rigid polyurethane foams blown with C1-C4 HFCs or HCFCs. Chojnacki at Col 4/15-19 suggests that water and other materials including CFCs, other HCFCs, or HFCs, pentanes, and the like may optionally be included as a blowing agent in combination with the defined C1-C4 HFC or HCFC.

Furthermore, while the silicone surfactant formula of Chojnacki and that of the pending claims may have overlap in certain parameters, the blend average molecular weight (BAMW) of the polyether portion in Chojnacki's surfactants is 1200-6000 g/mole whereas in the present claims the BAMW is 450-1000 g/m.

For these reasons there has been no anticipation made out from the Chojnacki reference.

Examples 3 and 4 in Chojnacki's Table 2, demonstrate that structures with polyether pendant BAMWs in the 550-750 range performed significantly worse as cell structure regulators when compared to the range of 1200-6000 for the silicone surfactants Chojnacki's HFC and HCFC blown foams. Since Chojnacki is not directed toward hydrocarbon blowing agents it can provide no direction to a worker of ordinary skill in the art that moving to the non-preferred BAMW range would improve performance with hydrocarbon blowing agents. Moreover, the examples in Applicants' specification shows the advantages achieved using Applicants' defined silicone surfactants and C4 and/or C5 hydrocarbon blown rigid polyurethane compositions.

Accordingly, Applicants submit that Chojnacki also does not render obvious the claimed subject matter as a whole defined by Applicants' pending claims. Applicants request reconsideration of this rejection and its withdrawal.

Claims 1-22 were rejected under 103a as being unpatentable over Fishback (US 5,686, 499) in view of Wohlman (US 6,891,051). Applicants submit that such combination of references neither teaches nor suggests the claimed subject matter as a whole defined by Applicants' pending claims.

Fishback is deficient with respect to any teaching or suggestion of the silicone surfactants as defined in Applicants' pending claims. Fishback teaches the use of a myriad of silicone surfactants at high levels of at least about 8 php in C4-C7 hydrocarbon blown foams. Fishback's disclosure regarding suitable silicone surfactants is so extensive that it runs from Col 11/35 to 17/21. There is no specificity or direction toward Applicants' defined silicone surfactants. In his examples, Fishback only uses two silicone surfactants, namely

L5440 and B-8462, which are not further identified beyond being "an oxyalkylene-silicone surfactant terminated with hydrocarbon groups" (Col 21/30-33). Neither of these surfactants are believed to be within the structure defined in Applicants' pending claims.

Additionally, Fishback teaches the use of the silicone surfactants at use levels of about 8 parts or higher to improve flame resistance and k factors. Silicone surfactants are typically used at 0.5 to 3.5 parts per 100 parts polyol as foam cell regulators as recited in Applicants' claims. Fishback at Col 22/53-59 states that this higher use level indicates the operation of a different chemical mechanism besides that customarily associated with the use of surfactants as salt regulators. While Fishback does show some narrower structure ranges, these structures differ in multiple respects with the parameters defined in Applicants' pending claims.

This deficiency of Fishback as to Applicants' particular silicone surfactants is not remedied by Wohlman which teaches silicone erucate esters for use in hair treatment compositions. A worker of ordinary skill in the art would not look to Wohlman for modifying Fishback in any respect whatsoever because of the two extraordinarily diverse technical areas, namely polyurethane foams and hair treatment compositions. The dimethicone copolymers shown in Wohlman at Col 4/9-32 are merely a teaching with regard to the starting hydroxy-containing silicone surfactants that can be esterified with erucic acid to form the silicone erucate esters suitable for hair treatment applications. Moreover, the dimethicone copolymers shown in Wohlman in no way direct a skilled worker to the particular silicone surfactants of Applicants' pending claims for C4-C5 hydrocarbon blown polyurethane foams.

In view of the above remarks, Applicants request reconsideration of this rejection based on Fishback and Wohlman and its withdrawal.

Claims 1-22 were rejected under 103a as being unpatentable of Fishback in view of Gerkin (US 5,525,640). Applicants submit that this combination of reference neither teaches nor renders obvious Applicants' claimed subject matter as a whole.

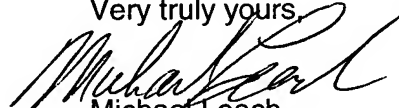
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The deficiencies with regard to Fishback were discussed above. Such deficiencies cannot be remedied by the Examiner's citation of Gerkin which merely discloses a wide range of silicone surfactants for flexible foams not blown with hydrocarbons which have very different cell regulation requirements than rigid foams. The silicone-polyether structures of Gerkin differ substantially from those in Applicants' pending claims. Applicants submit that Gerkin provides no guidance to investigate other polyethers used with hydrocarbon blowing agents in rigid foam.

In view of the above remarks, Applicants request reconsideration of this rejection based on Fishback and Gerkin and its withdrawal.

Believing the case is in condition for allowance Applicants solicit an action to that effect.

Very truly yours,

A handwritten signature in black ink, appearing to read "Michael Leach", written over the typed name.

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